GUNAVARAN BRIHADISWARAN

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EDUCATION

Ph.D. in Computer Engineering
North Carolina State University   Aug 2022 - Present
- · GPA: 4.0/4.0
- · Research area: DNA-based data storage

M.Sc. by Research in Computer Science
University of Moratuwa, Sri Lanka   Feb 2020 - May 2021
- · GPA: 4.0/4.0
- · Thesis title: Accelerating k-mer counting for genomic analysis

B.Sc. Engineering (Hons) in Computer Science and Engineering
University of Moratuwa, Sri Lanka   Dec 2015 - Jan 2020
- · GPA: 4.02/4.2 [3.93 out of 4.0], Ranked 4th out of 128
- · In Dean's Honors List in all eight consecutive semesters

PROFESSIONAL APPOINTMENTS

University of Moratuwa, Sri Lanka | Department of Computer Science and Engineering
Lecturer (on Contract)   Jul 2021 - Jan 2022

University of Sri Jayewardenepura, Sri Lanka | Department of Computer Engineering
Lecturer (Visiting)   Oct 2020 - Mar 2021

RESEARCH EXPERIENCE

Modeling DNA-DNA Interactions to Scale DNA-based Data Storage Systems | Python
Graduate Research Assistant, NC State University   Aug 2022 - Present
- · The goal of this research is to achieve a better understanding of the interactions between DNA sequences which will facilitate efficient primer design.

Optimizing K-mer Counting and Querying in Commodity Clusters ⎘ | C++, Parallel and Distributed computing
Co-supervisor, University of Moratuwa   Apr 2021 - Jan 2022
- · Co-supervising three undergraduates with Prof. Sanath Jayasena.
- · The aim of this research is developing an efficient MPI(Message Passing Interface)-based distributed k-mer counting and querying tool optimized for commodity clusters.

Accelerating K-mer Counting for Genomic Analysis ⎘ | C, Parallel computing
Research Assistant, University of Moratuwa   Feb 2020 - May 2021
- · Developed "Frigate", a tool capable of efficient counting and querying of k-mers in a shared memory environment.
- · Implemented a parallel processing pipeline that utilizes lock-free synchronization (compare-and-swap).

Psychophysiological Data-Based Decision Support System for Classification of Autism Spectrum Disorder ⎘ | Python, Machine learning
Undergraduate, University of Moratuwa   Jan 2019 - Dec 2019
- · The goal of this research was to develop a decision support system for the identification of Autism Spectrum Disorder (ASD) using EEG and facial thermographic data.

- Built Python scripts to pre-process EEG data and applied machine learning models to identify the severity level of ASD.
- Collaborated with researchers from Old Dominion University, University of New Orleans and Indiana University-Purdue University.

Optimizing Data Structures for Byte-Addressable Persistent Memory ⧉ | C, Persistent memory, Parallel computing

Research Intern, ASSET Research Group at SUTD, Singapore   Jun 2018 - Dec 2018
- Contributed to the design and development of two novel B+-trees, Crab-Tree and Circ-Tree, which outperformed state of the art tree data structures.
- Implemented multiple data structures (B+ tree, skip list, radix tree and log-structured merged tree) and their variants that were modified for persistent memory, eleven in total.

PUBLICATIONS

Journals

- Wang, C., **Brihadiswaran, G.**, Jiang, X., & Chattopadhyay, S. (2021). Circ-tree: A B+-Tree variant with circular design for persistent memory. *IEEE Transactions on Computers.* 📄

- Wang, C., Chattopadhyay, S., & **Brihadiswaran, G.** (2020). Crab-tree: A Crash Recoverable B+-tree Variant for Persistent Memory with ARMv8 Architecture. *ACM Transactions on Embedded Computing Systems (TECS).* 📄

- Haputhanthri, D., **Brihadiswaran, G.**, Gunathilaka, S., Meedeniya, D., Jayarathna, S., Jaime, M., & Harshaw, C. (2020). Integration of Facial Thermography in EEG-based Classification of ASD. *International Journal of Automation and Computing.* 📄

- **Brihadiswaran, G.**, Haputhanthri, D., Gunathilaka, S., Meedeeniya, D., & Jayarathna, S. (2019). EEG-based Processing and Classification Methodologies for Autism Spectrum Disorder: A Review. *Journal of Computer Science.* 📄

Conferences

- **Gunavaran Brihadiswaran** and Sanath Jayasena. (2021, May). Frigate: a fast, in-memory tool for counting and querying k-mers. In *2021 13th International Conference on Bioinformatics and Biomedical Technology (ICBBT '21)*, accepted for publication.

- Wang, C., Chattopadhyay, S., & **Brihadiswaran, G.** (2019, June). Crash recoverable ARMv8-oriented B+-tree for byte-addressable persistent memory. In *Proceedings of the 20th ACM SIGPLAN/SIGBED International Conference on Languages, Compilers, and Tools for Embedded Systems.* 📄

- Haputhanthri, D., **Brihadiswaran, G.**, Gunathilaka, S., Meedeniya, D., Jayawardena, Y., Jayarathna, S., & Jaime, M. (2019, July). An EEG based Channel Optimized Classification Approach for Autism Spectrum Disorder. In *2019 Moratuwa Engineering Research Conference (MERCon).* 📄

TEACHING EXPERIENCE

University of Moratuwa, Sri Lanka | Department of Computer Science and Engineering

Lecturer (on Contract)   Jul 2021 - Jan 2022
- Assisting in the delivery of three undergraduate courses ranging in size from 58-900 students.
- Supporting faculty with administrative tasks.

Teaching Assistant 2019 - 2021

- · Modules: CS4522 - Advanced Algorithms (Spring 2021), CS3062 - Theory of Computing (Spring 2020), CS3202 - Software Engineering Project (Spring 2020), and CS2963 - Presentation Skills (Spring 2019)
- · Conducted weekly workshops on communication skills for a group of 25 undergraduates and evaluated student presentations.
- · Prepared and graded weekly quizzes, assignments, and mid-semester exams of 12-128 students.
- · Mentored 8 students in their semester projects and provided feedback on use cases, software design, and technology stack.

University of Sri Jayewardenepura, Sri Lanka | Department of Computer Engineering

Lecturer (Visiting) Oct 2020 - Mar 2021

- · Conducted lectures on GPU Programming for a class of 5 students.
- · Prepared and graded assignments, labs, and mid- and end-semester exams.

HONORS AND AWARDS

University Graduate Fellowship - NC State University 2022-23

Graduate Merit Award - NC State University 2022-23

The Migara Ratnatunga Trust Award 2019/2020
- · For Industrial Training of University Undergraduates

Mahapola Higher Education Merit Scholarship 2015-2020
- · For outstanding performance in G.C.E A/L Examination (Value: $1000)

Semi-Finalist in ihack 3.0 (hackathon organized by University of Colombo, Sri Lanka) 2016

Finalist in Yarl Geek Challenge (hackathon organized by Yarl IT Hub) 2016

Finalist in Code Sprint 2.0 (hackathon organized by IEEE Student Branch of the IIT) 2016

Best Student of the Year at Jaffna Hindu College 2014

Gold Medalist in Creative Writing and Public Speaking 2011 & 2012
- · At the Sri Lanka Festival of Music, Dance and Speech

Gold Medalist in Provincial Level Oratory and Debate Competitions 2012

Most Outstanding Exhibit at Sri Lanka Science & Engineering Fair 2011
- · Awarded by the Yale Science And Engineering Association Inc.

Best Project Team in Stockholm Junior Water Prize Competition 2010

SKILLS

Programming Languages: C/C++, CUDA C, Python, Java, PHP, CSS, HTML, SQL

Languages: English (full professional proficiency, TOEFL iBT score: 117/120), Tamil (native proficiency)